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ABSTRACT

Empirical studies of the school finance reforms of the 1970s have not indicated that equity has been satisfactorily achieved in all cases. The methods of equity analysis used and the data bases analyzed in those studies have differed enough to prevent ready comparison or the formulation of overall assessments of the effects of school finance reform as a whole. A hypothesis drawn from past analyses was tested using information for districts in Indiana, Iowa, and Illinois between 1972 and the late 1970s. Three dimensions of equity were considered: taxpayer equity, disparities in expenditure per pupil, and wealth neutrality. Contrary to expectations, the evidence indicated that progress had been greatest in achieving unconditional wealth neutrality rather than in reducing tax rate disparities between districts. On the whole, Indiana did least well, making gains only in the area of wealth neutrality. Iowa made considerable gains in all areas except conditional wealth neutrality. The results from Illincis were mixed and complicated by the existence of three kinds of school district in the state--elementary, secondary, and unit (K-12)--each of which was affected differently by reforms. (Author/PGD)

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EQUITY MEASUREMENTS IN SCHOOL FINANCE INDIANA, IOWA AND ILLINOIS

By G. Alan Hickrod, Ramesh Chaudhari, Ben C. Hubbard, and Virginia Lundeen
With Assistance and Commentary from:
Walter Bishop, Leland Tack and William Wilkerson

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May 1980

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Section A: Background of the Study

The decade of the 1970's will surely be characterized as the "reform" decade by school finance historians. Just how well these reforms succeeded, however, is likely to remain an important research and public policy question, well into the 1980's. As the decade came to a close some school finance experts were on the whole satisfied with the record of the 1970's and optimistic about the 1980's. In James Kelly's words, "Most of the plans reduce spending inequalities between rich and poor school districts and are not as strongly linked to property tax wealth as the old plans were. . . in most states continuing efforts by advocates of greater fiscal equity in education offer a good chance of achieving further reforms during the next few years."(1)

Empirical studies of reforms of the 1970's, however, may not support quite so sanguine a view of past achievements, nor so rosy a picture of future prospects, as Kelly would urge upon us. Studies of reforms of individual states such as those of Missouri and Colorado by Odden(2), Pennsylvania by Harris (3), Rhode Island by Ward(4), Virginia by Salmon and Shotwell (5), New Jersey by Goertz(6), Ohio by Harrison(7), Michigan by Phelps(8), and Illinois by Hickrod, Chaudhari and Hubbard(9), indicate less than completely satisfactory results from school finance reforms in these states. It must be admitted that the

overall record is difficult to ascertain from case studies of individual states. The methods of equity analysis are different with the different researchers, and the time periods selected for analysis are not the same. With the exception of the study of Illinois, the individual state case studies often select two points in time rather than to compute equity indices on an annual basis. The Illinois equity study, however, indicates that when equity monitoring takes place on a year-to-year basis over a time span of six or seven years, it is possible to observe curvilinear patterns in the time series, e.g., progress toward equity was made in Illinois for four years after a major reform in the summer of 1973, but in recent years this reform has deteriorated, and the state has moved away from equity on most of the equity indices.

Multi-state studies of school finance equity offer a not much clearer picture. Early efforts by Callahan and Wilken(10) and by Brown, Ginsberg, Killalea, Rosthal and Tron(11) have revealed mixed results. The monitoring attempt by the National Center for Educational Statistics yielded more optimistic conclusions(12) while the studies at the Rand Corporation by Carroll(13) are, by contrast, essentially pessimistic in tone. The extensive and comprehensive work by Berne and Stiefel (14) demonstrates clearly just how hard it is to summarize data on many different equity measurements over all fifty states. It is necessary, however, for the progress of school finance studies, to erect generalizations based upon

empirical research and then to test those generalizations by further empirical study. Therefore, from some of the single state studies, and from some of the multi-state studies, the authors of this paper derived a general hypothesis concerning the success of reforms in the 1970's and have proceeded to test this hypothesis against data from Illinois, Iowa, and Indiana.(15) The general hypothesis can be stated as follows:

> The reforms of the 1970's succeeded most in reducing the disparities in property tax burdens between school districts, succeeded less well in increasing wealth or fiscal neutrality, and succeeded least well in reducing disparities between districts in expenditures per pupil.

If confirmed, this would be a grim evaluation, indeed, of the massive reform efforts of the 1970's, since most of these reform efforts were undertaken, with considerable legal fanfare, to improve equity among students, rather than to improve equity among taxpayers.(16)

Section B: The Empirical Study

I. Populations, Time Periods, and Equity Measurements

To test this general hypothesis, the time periods 1972-73 to 1976-77 in Indiana, 1972-73 to 1977-78 in Iowa, and 1972-73 to 1978-79 in Illinois were selected. Some deviations from these time periods are noted in the specific tables. In Indiana the population includes 305 districts with 1,138,573 pupils in 1972-73 and 301 districts with 1,067,477 pupils in 1976-77. In Iowa the population was 452 districts with 607,393 pupils in 1972-73 and 449 districts with 547,782 pupils in 1977-78. In Illinois the 1973-74 population was 501 elementary

districts with 568,998 pupils, 145 high school districts with 335,059 pupils and 436 unit districts with 1,539,710 pupils. In 1978-79 the Illinois population was 439 elementary districts with 474,593 pupils, 126 high school districts with 322,187 pupils and 448 unit districts with 1,505,362 pupil. In Iowa and Indiana all results can be reported by unit (K-12 districts), however, in Illinois, the results must be reported by three sub-populations: elementary districts, high school districts, and unit (K-12) districts. No totally acceptable way has yet been found to merge the fiscal data of the Illinois sub-populations into a single population.

In recent years the amount of research and literature concerning equity goals in school finance has grown in almost an exponential fashion. Since our purpose here is to test a general hypothesis involving at least three dimensions of equity, e.g., taxpayer equity, expenditure per pupil disparity, and wealth neutrality, we will not attempt either a lengthy discussion of the equity concepts themselves, nor a detailed analysis of the operational definitions of these concepts. Fortunately, current school finance literature is rich in both of these matters and very few contributions, in our opinion, surpass those of Berne, Odden, and Stiefel. (17) We have, however, pointed out the imperfections of both the concepts and the measurements used in this report. To do otherwise would be to serve the discipline of school finance badly. We concur completely with Berne, Odden, Garms, and many others

that both our concepts and our measurements in school finance are at a very primitive level of development. For the most part we have chosen equity measurements that have been used extensively in Illinois and in a number of other states. Where the measurement technique may not be so well known to school finance researchers we have expanded the coverage to give the reader greater detail on the measurement technique employed.

We also wish to note at the outset that this paper is in no way a full blown "evaluation" of the school finance systems in Illinois, Indiana, and Iowa during the mid 1970's. We are reporting here on only some selected measures of equity, and the equity goal itself is by no means the only fiscal goal of modern state finance systems. Any contemporary school finance system strives to reach other goals such as: adequacy of the general support level relative to other states, attention to individual student needs, and to individual district needs, contribution to the economic efficiency of local school districts and attention also to forces affecting all school districts such as inflation and loss of pupils due to declining enrollment. As Odden has pointed out, these goals are often in conflict, and in particular, the attainment of efficiency may impair the attainment of equity especially as regards the poor and minority students.(18) Nevertheless, the equity goal remains an important goal of state school finance systems, and it is a goal which the state courts are not likely to let state departments of education and state legislatures forget.

The measure of taxpayer equity used here is very crude. It is simply the coefficient of variation (standard deviation divided by the mean and multiplied by 100) of tax rates between districts. This can surely be nothing more than a first rough approximation of the complex notion of variation in "tax burden." A thorough examination of tax burden takes one into the complicated question of the final incidence of the property tax and into the equally complicated question of the composition of the tax base of individual districts. It also involves the difficult question of partial assessment practices in the several states. The fact of the matter is that one cannot be absolutely sure that an equal tax rate between two school districts also constitutes an equal tax burden. One district may be able to "export" the tax and another may not.(19) However, to at least make an attempt to test the more general hypothesis we will sweep these reservations under the rug and proceed.

The measure of expenditure or revenue disparity between school districts is a bit more refined, but many problems remain with this equity measurement as well. Most studies of equity assume, as does this one, that less disparity in expenditures between school districts is a laudable state of affairs. Just as in the case of tax rates, less variation between school districts is deemed preferable to more variation between school districts. However, as Garms has pointed out, this is a very doubtful assumption.(20) Some of the variation in expenditures between school districts could be quite legiti-

mate, for example, variations due to different concentrations of pupils with special needs, or variations in expenditures per pupil due to cost of living differentials throughout the state. Theoretically, if all student needs could be reflected through a complex set of student weightings and if geographic cost-of-living could be reflected through indices developed for that purpose, then the "legitimate" sources of expenditure variation could be excluded, leaving a variation due primarily to different levels of local wealth. However, if the variation in expenditures due to variations in wealth is really the main point of interest then the univariate distribution of expenditures per pupil was probably the wrong operational specification of equity to use in the first place. Given these considerations, we are less than happy with measuring equity merely by looking at distributions of expenditure per pupil measurements between school districts. However, not only most school finance studies, but also most state courts, continue to place great emphasis on expenditure disparities, and this study accordingly has included them as an operational specification of the equity goal. Because of conceptual imperfections, however, we attach more importance to findings concerning wealth neutrality, e.g., the relationship between local wealth and expenditures, than to disparity measurements, either on expenditures or on tax rates. As will be clear latter in the findings section it is fortunate that we can do this.

As Berne's work makes abundantly clear, there are no measurements of school finance equity that do not automatically build in value assumptions.(21) The choice of the statistical method that will be used to do the "evaluating" itself is based on value assumption. This is especially clear with regard to disparities between school districts. If it is thought "acceptable" for high spending districts to either be held back from expenditure increases, or to have their expenditure levels reduced (an extremely unlikely political situation) then perhaps the coefficient of variation (C.V.) is a satisfactory statistical technique to employ in the measurement of variation. The C.V. takes into consideration all of the variation in expenditures per pupil between districts including both the high and the low spending districts in the distribution.

However, there is another school of thought, well represented among school administrators throughout the U. S., which holds that expenditure variation above the median or mean expenditure in the state should not be reduced and that, in fact, the only legitimate concern of the state is with the expenditure per pupil variation below some measure of central tendency. This group argues that "bringing up low spending districts" should be the primary concern of the state, and that high spending districts should be allowed to move out in front as far as they want to go. The current movement toward tax and expenditure limitation legislation or tax and expenditure constitutional limitations posses a real threat to this school of thought. A

number of respected school finance scholars, not the least of which was the late Paul Mort, held steadfastly to this policy position.(22) Professor Eugene McLoone is a forceful advocate of this position in the modern era.(23) McLoone has devised several indices to look at the bottom half of the expenditure distribution only. The particular one used in this report, termed the "McLoone Index" is constructed in such a fashion that its value should rise as fewer dollars are needed to raise all districts below the median expenditure to the median expenditure. It therefore is a measure of expenditure disparity, but only the disparity below the central tendency. Berne provides a listing of other measures of disparity which depend upon other value assumptions.(24) We have also included the "federal measure of disparity," which is the 95th percentile minus the 5th percentile divided by the 5th percentile multiplied by 100, and the simple range, the highest measurement minus the lowest measurement. If all measurements, both high and low, are to be considered, then the C.V. has some advantages over either the "federal measure of disparity" or the range, since one or two deviant measurements affect the range and the "federal measure of disparity" but not the C.V.

In addition to tax payer disparity and expenditure disparity the general hypothesis calls for a test of wealth neutrality, or fiscal neutrality as it is sometimes called. Wealth neutrality is a statement of the relationship between a measure or measures of school district wealth on the one hand, and

expenditures per pupil on the other hand. A system is judged wealth neutral if there is little or no relationship between local district wealth and local district expenditures per pupil. Wealth neutrality has more recently been conceptually divided into "simple" wealth neutrality versus "conditional wealth neutrality." "Conditional" wealth neutrality looks at the relationship between wealth and expenditures with one or more other school district characteristics controlled; for example, the tax rate of the district. The concept of "conditional" wealth neutrality has been developed in some detail by Friedman and Wiseman(25) and has been used recently to evaluate school finance progress in Illinois.(26) Friedman and Wiseman believe that "conditional" and "simple" wealth neutrality are not compatible state goals, e.g., the legislature must choose one or the other of these goals. Johns and Magers believe that "conditional" wealth neutrality is the more appropriate test for states that have any form of "reward for effort" or "district power equalization" types of grant-in-aid systems.(27) There is little question that the value assumptions underlying "absolute" or "simple" or "unconditional" wealth neutrality are quite different than the value assumptions underlying "conditional" wealth neutrality. In conditional wealth neutrality it is assumed that it is legitimate for expenditure levels to vary according to the willingness of local districts to tax themselves at different levels of effort. This source of variance is held constant and then, and then only, is the relation-

ship explored between local wealth and expenditure levels. This is a strongly local control oriented policy position. By contrast, unconditional wealth neutrality insists that there be little or no relationship between wealth and expenditures and that levels of tax rate are irrelevant, in fact everything is irrelevant, except that single relationship between local wealth and local expenditures. It might well be argued that the notion of "conditional" wealth neutrality is a much more realistic evaluation technique in the modern school finance scene. After all, if one really did not want expenditures to vary by local tax rates, then one should eliminate entirely the ability of local districts to tax more than the state requires. Viewed from this point of view, unconditional wealth neutrality would be an appropriate evaluation technique only for a handful of states which have deliberately restricted the "local leeway" of school districts to tax as they see fit, e.g. New Mexico, and probably Florida. As long as the state allows local districts to set local tax rates then the state has in fact "legitimized" this source of expenditure variation and some approach which partials out the expenditure variation due to different tax levels fits the prevailing institutional structure. The notion of "conditional" wealth neutrality can be expanded beyond simply holding constant the effect of tax rates. Garms has demonstrated that a standard multiple regression tool can be used to measure the relationship of wealth to expenditure conditional upon the distribution of not only tax rates, but also of at least some

special needs and special costs.(28) This would appear to be an alternative to trying to adjust the dependent variable, expenditures, for special needs through a complex pupil weighting mechanism or trying to adjust the dependent variable for geographic cost-of-living factors. As of this writing, however, the multiple regression approach has yet to be accepted by the legislatures or the courts as a preferred measure of wealth neutrality. Indeed, the whole notion of "conditional" wealth neutrality has not yet received a full court test.

Since the courts and legislatures are still using the notion of unconditional wealth neutrality, we have employed that concept in this report as well as "conditional" wealth neutrality. We have used two measurements of wealth neutrality. The first involves a special use of the Gini Index. As in previous research reported by the Center for the Study of Educational Finance at Illinois State University, this index is based upon a bivariate set of measurements, rather than a univariate set of measurements.(29) Berne refers to this as a "wealth weighted" Gini coefficient.(30) This usage is to be contrasted with the traditional Gini applications made by McLoone, Michelson, Grubb, Alexander, and others, which are based upon expenditures alone.(31) Since the Gini coefficient has been used in different ways in school finance research, it is necessary to ascertain, in each piece of research, just what kind of application has been made.(32)

Basically what we have done with this "wealth weighted Gini" is to rank the school districts from low to high

upon some specification of wealth. In this report we have used property valuations per pupil. Once this wealth ranking of districts is completed, a cumulative percentage distribution of pupils is then formed, starting from the poorest district and working to the top. A similar cumulative distribution is established for state and local revenues or expenditures. The two cumulative percentage distributions (wealth and expenditures) are then plotted on an X-Y axis. If local wealth were not a factor in expenditures in a given state, the X-Y plot of the two cumulative percentages, wealth and state and local revenues, would in fact be a straight line. That is, the poorest 10 per cent of the students would get 10 per cent of the available "pie" of state and local monies; the poorest 20 per cent would get 20 per cent; and so on. A distribution of state and local funds would prevail that would be "neutral" of local resource disparities, and this is exactly what is necessary in any operational definition of "wealth neutrality."

When the poorest 10 per cent of the students receive less than 10 per cent of the funds; the poorest 20 per cent, less than 20 per cent of the expenditures; and so on, the plotting of the cumulative percentages will result in a curve which departs from the straight line representing absolute wealth neutrality. This "Lorenz curve" is interesting in and of itself, but researchers usually prefer a numerical value which will describe the extent of the departure of the curve from the straight line. There are several ways of computing such a value, referred

to as a Gini Index, Gini coefficient, or coefficient of concentration. Appendix A to this paper, prepared by Ramesh Chaudhari, sets forth one possible calculation procedure. Readers interested in examining the computer program for such a calculation should address themselves to Dr. Chaudhari.(33) The Gini values should be interpreted in the following manner: the smaller the value of the coefficient, the closer the state has moved to the goal of unconditional wealth neutrality: that is, the larger values indicate a greater departure of the curve from the straight line. As long as the curve does not cross the line, the interpretation is straightforward. Unfortunately, we have found in recent usage that the curve does cross the line in some instances, and this makes interpretation difficult. We have, however, retained the procedure because the unit of analysis in the Gini is the student, rather than the school district. We shall return to this point later. We have indicated by an asterisk in the tables where the curve has crossed the line and where the Gini value is of doubtful interpretation.

Complications with the use of the Gini, and the lack of general acceptance among the research community of the "wealth weighted" Gini, have led us to use a more familiar tool in finance and economic research, the linear least squares regression, as an alternative to the wealth weighted Gini to measure unconditional wealth neutrality. This technique, used also by Michelson(34) and Feldstein(35) regresses expenditures against some measure of school district wealth. Both variables are transformed

into their logarithms to facilitate comparisons through time and space. This transformation renders an "elasticity" and Berne has found that this simple elasticity is a reliable measure of unconditional wealth neutrality.(36) However, recent research at the Center suggests that in some instances the transformations can effect the findings.(37) Therefore, in this report we have reported the regression coefficients both with and without transformations. We have introduced another procedure not found in our previous reporting of wealth neutrality in Illinois. The standard least squares regression technique treats each school district as if it had the same value. That is, Chicago has no more weight than the smallest school district in the state. This has some obvious limitation. Therefore to correct that situation we have performed the linear regressions with the districts weighted by the number of students in each district. Obviously in this weighted regression procedure the large cities in each of the three states will have far more effect on the values of the regression coefficients. We have reported the results for both unconditional wealth neutrality and conditional wealth neutrality in terms of both weighted and unweighted standardized regression coefficients (beta weights). If this weighting procedure proves satisfactory in further research we feel that the Gini procedure can now be safely retired since the pupil weighting procedure in regression analysis will accomplish most of what the wealth weighted Gini procedure was intended to do. The specification of wealth used in

this report is property valuation per pupil. Evidence from the several Illinois studies indicates that somewhat different findings can be expected when income is used as the specification of district wealth. However, there are problems in all three states in securing current income data.

Our operational definition of "conditional" wealth neutrality is a straightforward extention of the operationalization of unconditional wealth neutrality. We simply regressed expenditures upon both wealth and tax rate. The beta weight for wealth is the regression coefficient reported in the tables. There are problems with this procedure in that interactions exist between wealth and tax rates. Another approach might have been to stratify the school district population by tax rate levels and compute simple wealth/expenditure coefficients for each strata of tax rate. However, that would complicate the tables without necessarily producing any clearer analysis. For the moment we are in agreement with Garms that the multiple regression approach is satisfactory for modeling the conditional wealth neutrality situation.

One final methodological caution to the reader is in order before proceeding to the findings. In a recent multi-state equity study, Odden, Berne, and Stiefel note:

> To assess the attainment of all equity goals under all equity principles with numerous possible statistics would be a monumental task. Even to do so for one or two goals is a complex undertaking. To do so for one or two goals for all states is exceedingly difficult because comparable data for all school districts across states are hard, if not impossible to obtain.(38)

We could not agree more. For example, in this study it proved not possible to get a crucial variable, expenditures, to be exactly the same in each state. In Illinois, in fact, the measurement is not even an expenditure at all, rather it is a revenue estimate consisting of the revenues locally raised plus the general state aid, excluding state categorical aid and excluding federal aid. In Iowa, it is the total expenditures minus the title one federal payments; in Indiana, this measurement is current expenditures. In similar fashion the measurement of pupils is not identical. In Iowa, it is average daily attendance; in Indiana, it is average daily membership; and in Illinois, it is weighted average daily attendance. And, as has already been noted, the time spans are different: seven years for Illinois, six for Iowa, and five for Indiana. There are many other state-to-state differences, but these are enough to alert the reader to the great difficulty of making comparisons and contrasts between the three states. However, we believe it is possible to make some rough comparisons between states as they make progress through time toward equity goals. That is, given their own peculiarities and their own institutional arrangements, it is still possible to note whether Illinois made greater or less progress toward an equity goal than did Indiana or Iowa. Such statements must be very tentative, given the slippery nature of the data, but we shall attempt the task anyway and at various points in this paper we shall make state-to-state comparisons of the equity situation

at a given point in time and changes in the equity situation through time.

II. Findings

The tables in this paper are grouped by the equity concepts employed. We shall look first at the disparity in the tax burden situation, then at the expenditure disparity situation, and then finally at the wealth neutrality situation, both in unconditional terms and in conditional terms. The magnitude of the problem in the three states shall be examined and progress through time shall be explored. However, progress toward state equity goals depends upon the equity situation that a given state confronts at a given point in time. From prior research we know that the equity situation is likely to be worse where there are more school districts in the state, where the state is geographically large, and where there is a history of unbalanced urban growth throughout the state.(39) We should expect then, a-priori, to find that the equity situation might be worse in Illinois than in Indiana or Iowa. Illinois has far more school districts than either Indiana or Iowa, it is geographically larger, and there has been a history of rapid industrialization and urbanization in the northern portion of Illinois compared to the relatively more rural nature of the central portion and the south. This more difficult equity situation should be observable in terms of disparity in local wealth between school districts.

Table one reports on disparity in property valuation per pupil between school districts in the three states. The unweighted coefficient of variation and the federal measure of disparity were used to measure the dispersion of property valuation per pupil. As expected, the disparity in wealth between school districts was smaller in 1977-78 in Iowa than it was in 1978-79 in Illinois (units), however, the 1976-77 district wealth disparity in Indiana, using the coefficient of variation, was the largest of the three states. The equity problem in Illinois is apparently not only a function of the large number of districts, but also the presence of an organizational school structure that calls for three types of districts: unit, elementary, and secondary. The variation between Illinois elementaries in wealth is observed to be almost twice the variation in wealth between Indiana districts and Iowa districts, both of which are all unit districts. It is obvious that the State of Illinois is confronted with a serious initial equity situation within its population of elementary school districts. Since elementary districts are smaller in size geographically than either units or secondary districts, we should expect to find greater variation between many kinds of district measurements taken. However, the magnitude of the variation in wealth between Illinois elementaries is still rather striking. If the State of Illinois finds itself confronted with a difficult initial equity problem with its elementary districts, the situation is at least <u>not</u> growing worse with the passage of time. By contrast,

Table one makes clear that in both Indiana and Iowa wealth disparity between school districts has been growing with the passage of time and a growing disparity can also be observed in Illinois high school districts. We can therefore conclude that, at least partially because of its dual district structure, the state agencies in Illinois must mount much stronger state fiscal programs than either Iowa or Indiana if the state government expects to equalize differences in local district wealth. However, by contrast, the initial and fundamental problems of unequal district wealth, from which almost all other fiscal equity problems, and many other problems of unequal educational opportunity flow, is slightly improving or stable in Illinois but is not improving in Indiana and Iowa.

Table two reports on disparity in tax rates between school districts for the three states. In recent years more and more state legislatures have adopted tax and expenditure limitation legislation, or tax and expenditure limitation constitutional amendments in order to reduce the overall tax burden.(40) One might assume therefore that a state with a great disparity in tax burden, or a growing disparity in tax burden, would be a likely candidate for this type of legislature or constitutional restriction. From the situation relative to wealth disparity reported in Table one we might expect to find greater inequalities in tax rates between the Illinois dual districts than in Illinois units or in Indiana and Iowa districts. This is apparently true, the coefficient

of variation is larger for the Illinois duals than for the other categories of districts. The smallest disparity in tax rates was found in Indiana districts in 1972-73. However, disparity in tax rates apparently grew between 1972-73 and 1976-77 in Indiana, while disparity in tax rates was being reduced in Iowa from 1972-73 to 1977-78. Illinois also shows a reduction in tax rate variation, but for unit districts the reduction is very slight. In the latter part of the seventies the disparity in tax rates in Illinois (units), Iowa, and Indiana was quite similar, e.g., the coefficients of variation are of similar magnitude. This had not been the case at the beginning of the time periods.

Tables three and four report on disparity in expenditures per pupil between school districts. As mentioned previously, the measure in Illinois is actually revenues raised locally plus general state aid. As we have already indicated, we have some reservations about this measure of equity, but it is the measure most often used by the courts in constitutional challenges to state school finance systems. As was the case with tax rates, we would expect to find the greatest disparity in the population of Illinois dual districts, e.g., separate elementary and high school districts, and that is indeed the case. In fact, even the unweighted coefficient of variation for unit districts in Illinois exceeds those for school districts in Indiana and Iowa. If simple expenditure differences are accepted as an indicator of equal educational

opportunity then the situation is best in Iowa, less satisfactory in Indiana, and least satisfactory in Illinois. The situation with respect to expenditure per pupil differences is especially satisfactory in Iowa since that state has made considerable progress in reducing expenditure per pupil differences between 1972-73 and 1977-78. The situation is less satisfactory in Indiana where expenditure per pupil differences have become greater between 1972-73 and 1976-77. In Illinois the situation is again mixed. In high school districts there has been a decrease in disparity in expenditure per pupil between 1972-73 and 1978-79. In Illinois unit districts differences in expenditure per pupil were greater at the end of the time period than at the beginning of the time period. For elementaries there was little change. It is interesting that when districts are weighted by pupils, Illinois does show some progress in reducing expenditure per pupil variation. Findings using the McLoone Index are similar to those using the coefficient of variation, e.g., the situation is best in Iowa, next best in Indiana, and least satisfactory in Illinois. In Illinois the number of low spending elementary districts seems to be the major problem. Perhaps most disconcerting in Illinois is the fact that both low spending elementaries and low spending unit districts have lost ground between 1972-73 and 1978-79, relative to the middle of their own distributions. It would appear from the data in Tables three and four that both Illinois and Indiana could be likely targets for constitutional challenges

based upon simple expenditure disparities. Illinois has wide disparities remaining in its elementary districts, though it can show progress in all categories of districts when the weighted approach is used. Indiana has smaller disparities but they have gotten worse with the passage of time. Iowa is in the best situation, disparities are small and have reduced with the passage of time.

Tables five, six and seven display the results of the unconditional wealth neutrality analysis. This is the simple bivariate relationship of property valuation per pupil to expenditures per pupil, or in the case of Illinois, property valuation per pupil to revenues locally raised plus general state aid. The figures for the Gini Index are displayed in the first line followed by four standardized regression coefficients (Beta weights). From the top they are: the regression in unweighted, that is, district terms; the regression when districts are weighted by the number of pupils in each district; the regression in district terms but this time transforming both variables into their logarithms; and finally the district weighted by pupils and also in the log transformations. The first matter that is striking in tables five, six and seven is that all values in the tables except two are less for the second point in time than for the first point in time. The two exceptions are both for Illinois elementaries, in an unweighted format (first for the variables per se, and second for their logs). In other words, no matter how one measures the matter, <u>all</u> <u>three</u>

states have made progress toward the goal of unconditional wealth neutrality. In Indiana, Iowa, and Illinois, expenditures are less a function of local district wealth than they were in the past. This finding stands in contrast to the findings on disparity in expenditure per pupil and presents a considerable dilemma for the school finance reformer. On the grounds of expenditure disparity, school finance reformers would find little to be cheerful about in the three states, however, on simple wealth neutrality grounds there would be some cause for optimism. State courts viewing the situation in the three states would be presented with the same dilemma. On expenditure disparity grounds there would be some cause to expect a constitutional challenge, but on wealth neutrality grounds the three states could defend themselves from such a challenge on the grounds that they were all making progress toward this goal.

There are, of course, state to state differences revealed in tables five, six, and seven. Where Illinois did not appear to do very well on expenditure per pupil disparity, at least in an unweighted form, the state does rather well on wealth neutrality. Illinois values on unconditional wealth neutrality have decreased with the passage of time. In fact, from the values of both the Gini Index and the regression coefficients it would appear that Illinois unit districts are very close to attaining absolute wealth neutrality, e.g., no positive linear relationship between wealth and expenditures at all. Very likely very few states can claim this situation to be true. We are encouraged that our finding on Illinois relative

to wealth neutrality is supported by entirely separate calculations on this state performed by Odden, Berne, and Stiefel.(41) As might be expected from prior results reported in this paper Illinois dual districts as opposed to Illinois unit districts still are not wealth neutral. In Iowa and Illinois the pupil weighting approach apparently makes a difference. When districts are weighted by the number of pupils in them, Iowa and Illinois show more progress toward wealth neutrality than when the districts are the unit of analysis. The regression values for Indiana and for Illinois dual districts remain high when weighted by the number of pupils. We conclude that these states might be likely candidates for constitutional challenges, based upon the fact that district wealth is related to the expenditure level in K-12 education. (This is a problem for dual districts in Illinois and for Indiana districts.) Progress toward wealth neutrality has been quite limited in both Indiana and Iowa, particularly in Iowa when the district is used as the basis of analysis. With regard to wealth neutrality, Illinois again appears to have problems in its population of elementary districts.

Tables eight, nine and ten contain the analysis for conditional wealth neutrality. The tables contain the standardized regression coefficients from a multiple regression equation that contains two independent variables: tax rate and property valuation per pupil. Only the standardized regression coefficients for property valuation per pupil are shown. The first interesting point is that these regression coefficients for conditional wealth neutrality tend to be larger than those

for unconditional wealth neutrality. This was also observed earlier by Schmink in a study of Illinois alone.(42) It is likely therefore that some of the "true" relationship between wealth and expenditures is hidden by the operation of tax rates. That is, if the variation in expenditures due to the different levels of willingness to tax are first removed then stronger relationships will be observed relative to wealth neutrality than was first believed to be the case. As is true for so much other research in education, it is possible that simple bivariate research overstates, or in this case, understates, the relationships of interest. Further multivariate research on the notion of wealth neutrality is clearly indicated. As far as state to state differences are concerned, the values for Iowa appear quite high relative to Indiana and Illinois. Perhaps more disturbing is the fact that the values in Iowa are increasing with the passage of time while they are decreasing with the passage of time in Indiana and some Illinois districts. Particularly intriguing is the State of Iowa. Whereas Iowa had the most satisfactory showing on expenditure per pupil disparity, it now has the most unsatisfactory showing on wealth neutrality. On unconditional wealth neutrality the values are high and on conditional wealth neutrality they are actually increasing with the passage of time. Iowa, therefore, perhaps more than Indiana, would be a likely target for a constitutional challenge based upon the lack of wealth neutrality.

Since the general hypothesis of this study was stated in terms of progress toward equity goals, Table eleven displays percentage gains and losses on selected equity criteria for the three states. The plus sign indicates a gain on this criterion and a minus sign a loss. Tax disparity is the coefficient of variation on tax rates; expenditure disparity (1) is the unweighted coefficient of variation of expenditures (that is, districts notweighted by pupils); expenditure disparity (2) is the McLoone Index (that is, the gain or loss made by low spending districts); unconditional wealth neutrality is the percentage gain or loss based upon the regression calculation where the district has been weighted by the number of pupils and a logarithmic transformation of the variables has been made; conditional wealth neutrality is likewise based on the regression calculation where the district is weighted by the number of pupils and the logarithmic transformation has taken place and the tax rate has been held constant.

On the basis of Table eleven we can give only very limited support to our general hypothesis. It is true that tax disparity has decreased in Iowa, but it has increased in Indiana, and the decreases in Illinois are minimal. By contrast all states show gains on unconditional wealth neutrality. These gains are impressive for Illinois unit districts, and modest for Indiana districts and Illinois elementary districts. The consistency of gains is broken, however, when conditional wealth neutrality becomes the model of evaluation. Here losses are

indicated for Iowa districts and for Illinois elementaries. Expenditure disparities show mixed results. Illinois high school districts and Iowa districts show a reduction in disparity, but Illinois unit districts and Indiana districts are less equal at the end of this time period than at the beginning of the time period. Changes in the McLoone Index are modest, and in the wrong direction for Illinois unit districts and Illinois elementary districts.

III. Conclusions

We find insufficient evidence to support the notion that the progress toward equity goals in the 1970's in the three states was primarily a matter of progress in reducing tax rate disparity between school districts. To the contrary, our evidence indicates that the greatest progress was made on wealth neutrality, at least on unconditional wealth neutrality, in all three states. It is true that the conditional wealth neutrality model does not present such a clear-cut situation. There are also some important state-to-state differences. On the whole Indiana does least well of the three states, showing greater tax disparity and greater expenditure disparity at the end of the time period and making only modest gains on wealth neutrality. Iowa, by contrast, makes impressive gains on tax disparity and expenditure disparity and, at least on unconditional wealth neutrality, also shows considerable gains. Only on conditional wealth neutrality is the Iowa showing blemished. Illinois

appears to fall between Indiana and Iowa and its showing varies according to which of the three populations is selected for analysis: unit, elementary, or secondary. Illinois unit districts are particularly interesting in that they show losses on expenditure disparity but sizeable, indeed very impressive, gains on wealth neutrality. Illinois elementary districts show little progress on any criteria.

We conclude from this investigation that a state may make very uneven progress toward some general equity goal if that equity goal is operationalized in different ways. State legislatures, state boards of education, governors' offices, may well have to indicate some preference for tax disparity, expenditure disparity reduction, or for a gain in wealth neutrality. Fiscal policies designed to reduce expenditure disparity may or may not contribute to wealth neutrality. We conclude also that states like Illinois with dual district structures can not be judged solely on the basis of the results for their unit districts. State with separate elementary and high school districts, as well as K-12 districts, have probably aggrevated their equity problems by this form of administrative organization. It is extremely difficult to get a "fix" on the overall equity situation in states like Illinois with three distinct populations of school districts.

Odden has recently stressed the possible conflicts that a state may face in K-12 fiscal policy when the state tries to accomplish both the goals of efficiency and equity.(43) On the basis of the results in this investigation we are prepared to

conclude that a state may also face equally difficult choices when it tries to simultaneously accomplish the three equity goals of tax rate disparity reduction, expenditure per pupil disparity reduction, and gains on wealth neutrality. For reasons we have already indicated, e.g., that some expenditure per pupil differences between school districts are quite legitimate, the authors of this paper are more inclined to emphasize the goal of wealth neutrality than they are to emphasize reductions in expenditure per pupil disparity. The remaining choice, between tax rate disparity reduction and wealth neutrality is more difficult. Some forms of tax rate disparity reduction probably contribute to wealth neutrality, as when either statutory or constitutional limitations restrict the ability of wealthy districts to use their affluent tax base to spend more on their pupils.(44) However, the theoretical interactions between tax burden disparity, the general notion of tax relief, and the accomplishment of wealth neutrality have not been worked out, and are obviously beyond the scope of this primarily empirical investigation. We can only observe that since most of the reforms of the 1970's were undertaken in the name of student equity, rather than tax payer equity, that more emphasis should be placed upon the attainment of wealth neutrality than upon the reduction of tax rate disparity. We have, however, absolutely no doubt that others will make other value judgments. Goals in school finance rest upon deep political, economic, and social values. In our judgment there is no way to separate the goal choices from the underlying ideological value components.

Section C: Historical and Political Explanations of The Empirical Results

Dr. Walter Bishop, Dr. Leland Tack and Dr. Robert Benton concur with this review of the study for the Iowa portion of the report prepared by Dr. Tack, which follows.

I. Iowa

The study conducted by the Center for the Study of Educational Finance on progress toward school finance equity goals in Indiana, Iowa and Illinois indicates Iowa has made progress toward reducing tax disparity, expenditure disparity, and achieving greater unconditional wealth neutrality. Only with respect to conditional wealth neutrality did the study indicate progress has not been made.

I believe that Iowa appears to look worse on the conditional neutrality measure in 1977-78 than it did in 1972-73 for three reasons: (1) the measure is inappropriate with respect to Iowa school budgets, (2) changes have occurred in tax rates independent of local desires to spend more, and (3) changes have occurred in enrollment, primarily enrollment decline, affecting per pupil amounts while the change to total assessed valuation remains relatively constant with respect to other districts.

As noted in the study on page 9, "Wealth neutrality is a statement of the relationship between a measure or measures of school district wealth on the one hand, and expenditures per pupil on the other hand. A system is judged wealth neutral if there is little or no relationship between local district wealth

and local district expenditures per pupil." Conditional wealth neutrality looks at the same relationship between wealth and expenditures but controls for other district characteristics such as the tax rate of districts.

The study points out on page 10, "In conditional wealth neutrality it is assumed that it is legitimate for expenditure levels to vary according to the willingness of local districts to tax themselves at different levels of effort. . . This is a strongly local control oriented policy position."

Budgets of Iowa school districts do not vary by the willingness of local districts to tax themselves except to the extent the budgets varied prior to 1972-73 and that this variance has not been removed by the additional allowable growth provision. Only the enrichment levy provides local leeway but this provides only a small amount of money, and to only a few districts. I don't believe that this has had an impact on the analysis.

The assumption that local districts can spend whatever the local patrons are willing to tax themselves is clearly erroneous in Iowa. Hence, the basic assumption necessary to consider wealth neutrality conditional on tax rate is not appropriate.

Although the above is the overriding problem in examining conditional wealth neutrality, it is interesting to examine why expenditures appear to be more dependent upon wealth in 1977-78 than in 1972-73 when tax rates are considered.

First, it is very possible the equalization of assessed valuation, which has taken place since 1976, has had an impact on tax rates to cause this noted change. I have not examined this, but I am certain this has had some impact. However, most of the change in the weight associated with assessed valuation is due to a nonconstant student measure and/or the rate of change in the average daily attendance. The rate of change in ADA from 1972-73 to 1977-78 was found to be highly correlated (-.71) with the rate of change in assessed valuation by pupil. As would be expected, as enrollment goes down, assessed valuation per pupil goes up. Not necessarily because of a change in assessed valuation but because of a change in enrollment.

When the rate of enrollment change is added to the analysis, the weight associated with the conditional wealth neutrality goes from the study reported 1.1725 to my calculated value of 1.0545 in 1977-78. In 1972-73, the weight was 1.0563 or the impact of wealth actually decreased when enrollment change was taken into consideration. A similar change is noted in the unconditional analysis where the weight changes from .6078 to .4911 in 1977-78.

II. Indiana

Dr. William Wilkerson comments on the Indiana findings as follows.

A brief explanation of Indiana's school finance program from 1972-73 through 1976-77 may be helpful to those attempting to understand the findings and impoications of this study.

Indiana has long used a Strayer-Haig program with unweighted pupils as the need measure, with a foundation program level at about 50 per cent of average per pupil current expenditure, with a changeable tax rate at about 40 percent of the local tax rate cap, and with other features such as weighting for teacher training and experience. Indiana also had a state transportation formula generating General Fund revenues, and expenditures for pupil transportation were included in current expenditure data.

Beginning in calendar 1974, local school districts could generate no more property tax dollars for General Fund purposes than was obtained in 1973. Some minor modifications in this limitation were allowed for those few districts gaining enrollment or who opened new facilities; but from 1973 to 1978 local property tax revenues for schools increased only from $556 million to $570 million. Thus, essentially, all local ability or or effort disparities existing in 1973 were frozen in place for subsequent years.

Since 1973, a variety of state aid schemes was used to furnish most of the "new" money from state sources. These included an updated Strayer-Haig program which affected very few districts, since growth in assessed valuation coupled with the frozen tax levy was resulting in lower tax rates locally. A system of guaranteeing a fixed amount of new money per pupil became dominant and by 1976-77 only one of the 304 districts was actually utilizing the Strayer-Haig formula to generate its new state dollars.

Another confounding variable during the period of time included in this study was the differential rates of enrollment changes among districts. Those with rapid declines fared better financially than others, since their frozen local levy and their guaranteed state aid level (always based on the prior year) were divided by fewer pupils. These districts typically were urban, and had higher levels of both state and local support per pupil in 1972-73 and their relative revenue advantage per pupil increased over time.

Districts gaining enrollment, on the other hand, were able to increase their local support level slightly but since the state money was distributed primarily on the prior year entitlement, relative state aid per pupil declined.

With repect to tax rates, assessed valuation increased for almost all districts but the rates of increase varied markedly. Average General Fund property tax rates declined substantially for most districts, with significant decreases for those which experienced addition of a new power plant or other commerical or industrial expansion. Central cities, where enrollment declines were most drastic, usually gained little in assessed valuation.

According to the findings of the study, Indiana "lost" on tax and expenditure disparity while it "gained" on either measure of wealth neutrality. These findings are consistent with my expectations of what should have happened given these factors:

1. Property tax dollar levies were frozen from 1973 forward.
2. Assessed valuation of districts grew at varying rates, causing tax rates to vary more widely than at the establishment of the tax freeze.
3. Revenue available per pupil became a function of (a) revenue available at the beginning of the freeze, and (b) new revenue from state and local sources divided by number of pupils, with declining enrollment districts having more revenues per pupil than stable or growing enrollment districts. Rapidly declining districts were able to spend substantially more than gainers by 1976-77.
4. Local fiscal ability became less influential than factors 2 and 3 above in "explaining" spending, therefore, the system was more wealth neutral, by accident rather than design as time went by.

Intent of Indiana's policymakers, in addition to getting significant and lasting property tax relief, was to reduce revenue and expenditure disparities among school corporations. Holding revenues constant granting fixed per pupil amounts to corporations for which the Stryer-Haig formula didn't function, and setting the parameters for the Strayer-Haig formula to aid the less wealthy districts would have worked toward reduction of spending and revenue disparities but the extent of impact of enrollment decline was not foreseen. In the past two years, "de-ghosting" factors have been put in the state aid scheme to try to address this problem, and more attention has been given

also to the financial plight of the relatively few districts gaining pupils.

If the study were extended to include 1980, I am sure the disparities in revenue and expenditures would have been more pronounced than for 1972-73 to 1976-77, since state aid in the past two years moved from uniform per pupil flat grant increases to percentage increases based on revenue available. With respect to wealth neutrality, I don't know what might have happened statistically but local assessed valuation has not been much of a determinant of revenue potential since the property tax freeze began, and my expectation would be for continued progress (greater wealth neutrality) on that dimension.

III. Illinois

Dr. Ben Hubbard concurs with the following review prepared by Dr. Walter Bishop, concerning the Illinois equity situation.

The 1970 Constitution of the State of Illinois, Article X, Education, Section 1 states: "A fundamental goal of the People of the State is the educational development of all persons to the limits of their capacities. . . The State has the primary responsibility for financing the system of public education." Neither of these goals has been accomplished!

In 1973, House Bill 1484 became Public Act 78-215 and amended Section 18-8 of Chapter 122 of the Statutes of Illinois. This new law permitted school districts to choose the portion of the formula that provided the most state aid. Most school

districts received more money from the new Resource Equalizer (district power equalization) portion of the formula. In every case each district received more state aid than they would have under the old Strayer-Haig formula.

The new formula was developed to improve fiscal neutrality. Although it was an attempt to equalize educational expenditures within the state, it sometimes produced the opposite results.

The new formula attempted to equalize state aid with a "reward for local effort" clause based on the local district's education tax rate. The higher the tax rate, the more state aid the district was eligible to receive. A set minimum assessed valuation per pupil guaranteed a maximum of $1,260 per weighted pupil from local and state funds.

In theory and in the form it was presented to the legislature, the new formula achieved the goals of fiscal neutrality. and equity. However, legislative changes in the operating tax rates, guaranteed assessed valuation, weighting of pupils, and limited access to full funding distorted the original proposal.

Illinois is a large, diverse state. There are over a thousand school districts of three types (elementary, high and unit district). With this diversity and the geo-political phenomenon that occurred over the time of this study, fiscal neutrality and equity suffered. From 1972 to 1977 the following events distorted equity of state aid in this study.

1. The formula contained a limited access clause. No district could receive more than a 25 percent increase in state aid per year.

2. There was no inflation factor in the formula. Education costs increased faster than the increases in state aid.
3. The recession of 1973 caused several years of partial funding of the state aid formula.
4. The tax payers revolt kept local districts from reaching maximum tax rates. Thus, they were denied additonal state aid under the reward for local effort clause.
5. State aid was related to average daily attendance. Declining enrollments caused decreases in average daily attendance.
5. Local school district budgets had to be approved before it was known how much state aid was available.
6. Inflation caused local assessments to rise and tax rates to decline. County clerks levy an amount of money, not a tax rate. Maximum rates were sometimes impossible to achieve, causing a loss of state aid.
7. Inconsistent assessments in townships and between counties, and inequitable collection distribution of local taxes at the county level caused inconsistencies in generation of local tax dollars.
8. Administrative overhead, fixed costs and instructional costs have consumed more of the total budget.
9. Non-funding and partial-funding of mandated programs have caused additional burdens on local budgets.

Dr. Ben Hubbard is quoted in Dr. Walter Bishop's "A Study of Equalization Following the 1973 School Funding Reform Act in Illinois," April 1975, on pages 84-86:

House Bill 1484 became P. A. 78-215 and amended Section 18-8 of Chapter 122 of the Statutes of Illinois. Dr. Ben C. Hubbard is a major author of House Bill 1484. After a year in operation, Dr. Hubbard put the new state aid formula in perspective:

> SUBJECT: Your questions:
> 1. What were the real goals of 1484;
> 2. How were these goals politicalized.
>
> There are some parts of politicalizing any principle or principles that at times mitigate against accomplishing the desired goals. The real problem, however, is that persons not familiar with the goals of a piece of legislation or who have other goals will judge legislation by standards it was not meant to meet. A classic example could be H. B. 1484. Many of its critics have pointed out that it does not give all students the same access to funds. The General Assembly clearly meant to adopt a formula that rewarded those districts which did the most in terms of tax effort. No effort results in no aid, etc.
>
> As we drafted H. B. 1484, provision was made to allow local boards to set the tax rate that would determine the state aid received. The General Assembly rejected this change and instead left the power to tax above certain minimums in the hands of the voters. This decision was made after the Rodriguez case had been decided by the U. S. Supreme Court and the pressure for equal access was not as great as it had been when we proposed the bill. In other words, the General Assembly knew it was not giving all boards the same access and they chose not to do so.
>
> Both politics and dollars accounted for the most perplexing parts of H. B. 1484, namely the way it was put into effect through time and the different ADA measures. Because of a limitation of about $200,000,000 or less in increased revenue per year a formula that was to cost $700,000,000 more could not be put into effect in a single year. The increase of 1/4 of entitlement each of four years seemed to be fairer than any other system and was adopted.

Politics resulted in compromising the foundation formula and the addition of .45 weighting for Title I students. This was done to please a strong minority (chiefly the Democratic members of the House and Senate) and the OSPI. It helped some schools, but contributed to the complication of the formula.

The bill was not designed just to improve equalization within types of districts but was designed to give all communities equal access to dollars based on equal treatment of all students. Prior to H. B. 1484, the state sent different amounts to students in elementary, high school, and unit districts if assessments behind each child were the same. House Bill 1484 had as one of its goals to correct, through time, this discrimination and it will accomplish this. However, one of the most consistent criticisms of H. B. 1484 has come from persons who do not want this discrimination corrected. It was the will of the General Assembly, however, that this be done.

To have someone analyze H. B. 1484 by a simple Pearson product correlation of equalization when this was not the goal of the act does it an injustice. In my judgment the bill will result in:

1. Equal financial treatment of all students having the same tax rates and the same measured needs regardless of the type district they live in.
2. The measured needs currently adjust ADA for Title I concentration and high school weighting but other adjustments of need can and perhaps should be made after determining real needs.
3. Supporting a quality level of education rather than the minimum program of the foundation plan of the past.
4. Encouraging districts with low tax rates to pay a more proportionate share while reducing the tax rate in districts with high tax rates.

LLINOIS--STATE, LOCAL, AND FEDERAL RECEIPTS OF FUNDS FOR THE COMMON SCHOOLS DURING THE PERIOD 1966-67 THROUGH 1979-80
($ in millions)

Year	State	Percent State	Local[a]	Percent Local	Federal	Federal Percent	Total
1979-1980	$2,202.6[b]	43.00	$2,363.0[c]	46.00	$536.3[b]	11.00	$5,101.9
1978-1979	2,128.9	44.30	2,250.0[c]	46.82	427.0	8.88	4,805.9
1977-1978	2,040.9	44.32	2,134.0	46.35	429.8	9.33	4,604.7
1976-1977	2,000.6	46.88	1,942.6	45.52	324.2	7.60	4,267.4
1975-1976	1,988.1	48.36	1,856.8	45.16	266.5	6.48	4,111.4
1974-1975	1,326.1	34.39	2,310.6	59.93	219.1	5.68	3,855.8
1973-1974	1,325.8	38.10	1,962.5	56.39	191.8	5.51	3,480.1
1972-1973	1,160.3	36.72	1,808.4	57.23	191.2	6.05	3,159.9
1971-1972	995.7	37.42	1,503.6	56.70	156.5	5.88	2,660.8
1970-1971	954.7	39.61	1,301.4	54.00	154.0	6.39	2,410.1
1969-1970	787.0	30.74	1,651.4	64.51	121.6	4.75	2,560.0
1968-1969	516.6	27.94	1,228.3	66.42	104.3	5.64	1,849.2
1967-1968	491.9	27.13	1,230.0	67.84	91.1	5.03	1,813.0
1966-1967	368.6	25.04	1,014.1	68.89	89.4	6.07	1,472.1

[a]Includes only local tax revenues. Excluded are bond proceeds, interest income, sales of fixed assets and equipment, personal property replacement tax revenues, etc.

[b]Appropriated amount

[c]Estimated amount

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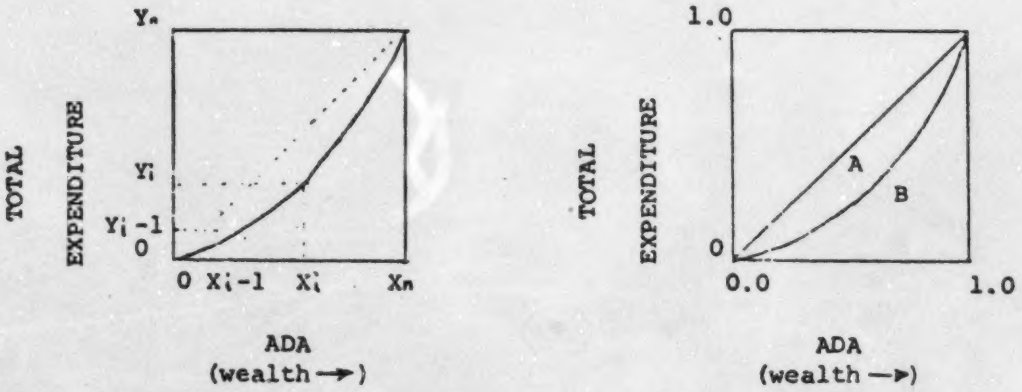
APPENDIX A

COMPUTATION OF GINI COEFFICIENT

The districts are sorted in ascending order of wealth per pupil. The cumulative proportions of pupils in the districts are represented by the horizontal axis and the cumulative proportions of total operating expenditures accounted for by these districts are represented by the



vertical axis. The curve thus plotted would be a straight line if the operating expenditures per pupil were the same in all districts. A sagging curve represents lesser expenditure in poorer districts. The measure of this inequality as defined by Gini Coefficient G is given by the formula:

$$G = \frac{\text{Area A}}{\text{Area (A+B)}}$$

or after further simplication

$$G = \frac{0{\cdot}5 - \text{Area B}}{0{\cdot}5}$$

$$= 1 - 2\text{Area B} \qquad (1)$$

Area B is the area under the curve and if n is the number of districts, and

X_i = cumulative proportion of ADA for the ith district

y_i = cumulative proportion of $ for the ith district

$$\text{Then Area B} = \sum_{i=1}^{n} \frac{(x_i - x_{i-1})\ (y_{i-1} + y_i)}{2}$$

$$\text{or 2 Area B} = \sum_{i=1}^{n} (x_i y_{i-1} - x_{i-1} y_{i-1} + x_i y_i - x_{i-1} y_i)$$

$$= (x_i y_0 - x_0 y_0 + x_1 y_1 - x_0 y_1$$

$$+ x_2 y_1 - x_1 y_1 + x_2 y_2 - x_1 y_2$$

$$+ x_n y_{n-1} - x_{n-1} y_{n-1} + x_n y_n - x_{n-1} y_n)$$

$$= (x_2 y_1 - x_1 y_2) + (x_3 y_2 - x_2 y_3) + \ldots$$

$$+ (x_n y_{n-1} - x_{n-1} y_n) + x_n y_n$$

$$= \sum_{i=2}^{n} (x_i y_{i-1} - x_{i-1} y_i) + 1 \qquad (2)$$

$$= 1 - \sum_{i=2}^{n} (x_{i-1} y_i - x_i y_{i-1})$$

substituting the value of area B in eq 1

$$G = \sum_{i=2}^{n} (x_{i-1} y_i - x_i y_{i-1}) \qquad (3)$$

Table 1

DISPARITY IN PROPERTY VALUATION PER PUPIL
ILLINOIS, INDIANA, IOWA

A. Illinois (unit)

	1973-74	1978-79
Coefficient of Variation (unweighted)	48.84	48.35
Federal Measure of Disparity*	170.45	207.07

B. Indiana

	1972-73	1976-77
Coefficient of Variation (unweighted)	45.56	49.54
Federal Measure of Disparity*	168.41	182.48

C. Iowa

	1972-73	1977-78
Coefficient of Variation (unweighted)	34.90	39.88
Federal Measure of Disparity*	187.07	202.08

D. Illinois (high school)

	1973-74	1978-79
Coefficient of Variation (unweighted)	50.77	53.57
Federal Measure of Disparity*	154.14	167.54

E. Illinois (elementaries)

	1973-74	1978-79
Coefficient of Variation (unweighted)	95.89	92.57
Federal Measure of Disparity*	394.03	408.07

*The "Federal Measure of Disparity" referred to is the 95th percentile, minus the 5th percentile divided by the 5th percentile multiplied by 100.

Table 2

DISPARITY IN TAX RATES AS MEASURED BY THE COEFFICIENT OF VARIATION: INDIANA, IOWA, AND ILLINOIS

	1972-73	1976-77
Indiana	14.78	17.62
	1972-73	1977-78
Iowa	19.52	16.20
	1973-74	1978-79
Illinois (unit)	15.78	15.68
Illinois (high school)	24.05	22.93
Illinois (elementaries)	25.13	24.06

Table 3

DISPARITY IN EXPENDITURES PER PUPIL: INDIANA AND IOWA

	Indiana	
	1972-73	1976-77
Coefficient of Variation (unweighted)	13.58	14.77
Coefficient of Variation (weighted)	12.79	13.59
McLoone Index	.9249	.9329
Federal Measure of Disparity	44.27	50.08
	Iowa	
	1972-73	1977-78
Coefficient of Variation (unweighted)	11.52	9.47
Coefficient of Variation (weighted)	10.55	7.59
McLoone Index	.9106	.9444
Federal Measure of Disparity	38.19	26.07

Table 4

DISPARITY IN LOCAL REVENUE PLUS GENERAL STATE AID PER PUPIL: ILLINOIS

	1973-74	1978-79
Coefficient of Variation (unweighted)		
Elementaries	30.43	30.22
High Schools	27.10	18.17
Units	13.90	15.71
Coefficient of Variation (weighted)		
Elementaries	23.19	21.56
High Schools	24.25	15.34
Units	11.05	10.56
McLoone Index		
Elementaries	.894	.883
High Schools	.865	.906
Units	.920	.892
Federal Measure of Disparity		
Elementaries	93.54	102.02
High Schools	106.75	67.94
Units	41.52	43.18

Table 5

UNCONDITIONAL* WEALTH NEUTRALITY IN INDIANA

	1972-73	1976-77
Gini Index	.0464**	.0453
Simple Regression		
unweighted	.71315	.51223
weighted	.67562	.60719
Simple Regression (Log Transformation)		
unweighted	.68156	.41162
weighted	.65760	.61025

**Lorenz curve crossed line

Table 6

UNCONDITIONAL* WEALTH NEUTRALITY IN IOWA

	1972-73	1977-78
Gini Index	.0245	.0088**
Simple Regression		
unweighted	.63021	.6078
weighted	.43162	.31793
Simple Regression (Log Transformation)		
unweighted	.63451	.56301
weighted	.44676	.26716

**Lorenz curve crossed line

*Simple relationship between local district property wealth per pupil and expenditures per pupil.

Table 7

UNCONDITIONAL* WEALTH NEUTRALITY IN ILLINOIS

	1973-74	1978-79
Gini Index		
Elementaries	.0824	.0691
High Schools	.0948	.0416
Units	.0260**	-.0015**
Simple Regression (unweighted)		
Elementaries	.67275	.72787
High Schools	.70074	.63357
Units	.55795	.50224
Simple Regression (weighted)		
Elementaries	.65714	.64944
High Schools	.64959	.46460
Units	.43385	.15279
Simple Regression (Log Transformation) (unweighted)		
Elementaries	.54462	.64837
High Schools	.66562	.60198
Units	.51416	.35990
Simple Regression (Log Transformation) (weighted)		
Elementaries	.60835	.58730
High Schools	.65611	.46991
Units	.51688	.07725

**Lorenz curve crossed line

*Simple relationship between local district property wealth per pupil and state and local revenue per pupil.

Table 8

CONDITIONAL* WEALTH NEUTRALITY IN INDIANA

	1972-73	1976-77
Multiple Regression		
unweighted	.86136	.58413
weighted	.88601	.74179
Multiple Regression (Log Transform)		
unweighted	.81259	.48078
weighted	.84365	.73785

Table 9

CONDITIONAL* WEALTH NEUTRALITY IN IOWA

	1972-73	1977-78
Multiple Regression		
unweighted	1.05631	1.17250
weighted	1.04371	1.09284
Multiple Regression (Log Transform)		
unweighted	1.21900	1.57170
weighted	1.29938	1.72882

*Relationship between local district property wealth per pupil and expenditures per pupils, with tax rates held constant.

Table 10

CONDITIONAL* WEALTH NEUTRALITY IN ILLINOIS

	1973-74	1978-79
Multiple Regression (unweighted)		
Elementaries	.83511	.93379
High Schools	.92943	.84337
Units	.84013	.68266
Multiple Regression (weighted)		
Elementaries	.68605	.74940
High Schools	.74832	.64067
Units	.60549	.39376
Multiple Regression (Log Transform) (unweighted)		
Elementaries	.65235	.80140
High Schools	.86058	.74182
Units	.77533	.49554
Multiple Regression (Log Transform) (weighted)		
Elementaries	.56763	.61647
High Schools	.71205	.58377
Units	.59251	.24902

*Relationship between local district property wealth per pupil and state and local revenues per pupil, with tax rates held constant.

Table 11

PERCENTAGE GAINS AND LOSSES ON SELECTED EQUITY CRITERIA IN INDIANA, IOWA, AND ILLINOIS

State	Tax * Disparity	Expenditure** Disparity (1)	Expenditure+ Disparity (2)	Uncondit++ Wealth Neutrality	Condit+++ Wealth Neutrality
Indiana	- 19.20	- 8.80	+ 0.86	+ 7.20	+ 12.54
Iowa	+ 17.00	+ 17.80	+ 3.70	+ 40.20	- 33.05
Illinois:					
Unit	+ 0.60	- 13.00	- 3.00	+ 85.05	+ 57.97
High School	+ 4.60	+ 32.90	+ 4.70	+ 28.38	+ 18.01
Elementary	+ 4.20	+ 0.70	- 1.20	+ 3.46	- 8.60

*Percent change in the coefficient of variation of tax rates over the period of study. Negative sign indicates that the coefficient was larger at the end of the period than at the beginning of the period and the positive sign indicates that the coefficient was smaller at the end of the period.

**Percent change in the coefficient of variation of unweighted expenditures per pupil. Negative sign indicates that the C.V. was larger at the end of the period and positive sign indicates that the C.V. was smaller at the end of the period.

+Percent change in the McLoone index for expenditures. Negative sign indicates that the index was smaller at the end of the period and positive sign indicates that the index was larger at the end of the period.

++Percent change in the regression coefficient computed by running a pupil weighted regression of wealth variable with the expenditure per pupil (both transformed into Logs). Negative sign indicates that the coefficient was larger toward the end and the positive sign indicates that the coefficient was smaller at the end.

+++Same as above except that the tax rate variable is also introduced in the regression to hold the tax rates constant.

APPENDIX B

THE FEDERAL WEALTH NEUTRALITY MEASUREMENT

By Dr. Ramesh B. Chaudhari

The federal wealth neutrality test was performed at two points in time for Illinois. This test was not performed for the states of Iowa and Indiana for the following reasons:

The concept of wealth neutrality as defined under S115.64 of the federal regulation is based on the idea of equal yield for equal effort. In Indiana, the local revenues were frozen since 1973, giving the residents of local districts very little leeway to increase their revenues by increasing the millage. Similarly, in Iowa, budget-ceilings were imposed on school districts starting in fiscal 1973. Although a growth factor was built in, districts were left with very little freedom to raise their general revenues through local taxes. The arguments made by the Iowa consultants in the previous section regarding the inappropriateness of a conditional neutrality test also apply to the federal wealth neutrality test.

Computation for Illinois

The following algorithm was used to compute the percentage of wealth neutral revenues in the Illinois school finance system. The algorithm is based on a more elaborate algorithm recommended by Dexter A. Majors of the U. S. Office of Education.

STEP 1. General State Aid: In this step the general state aid and local revenues were separated into wealth-neutral and non-wealth-neutral revenues. Computations were performed separately

for each type of school district, i.e., elementary, high school and unit districts. Results for the year 1973-74 are displayed in Table C.1.1 and for 1978-79 in Table C.2.1. The following procedure was adopted for these computations.

Column 1: Compute for each district the sum of the yield of the operating tax rate on the equalized assessed valuation and the general state aid entitlement.

Column 2: Compute for each district the amount in Column 1 attributable to additional weighting for Title I eligibles and high school and kindergarten students as assigned in the general state aid formula.

Column 3: Compute for each district the operating tax rate (OTR) in mills.

Column 4: Compute for each district the total average daily attendance (ADA).

Column 5: Subtract Column 2 from Column 1.

Column 6: Compute the amount per ADA per mill by dividing Column 5 by the product of Column 4 and Column 3. Identify the least amount.

Column 7: Compute for each district the result of multiplying the least amount identified in Column 6 by the product of Column 3 and Column 4.

Sums of Columns 1, 2, the least amount identified from Column 6 and the sum of Column 7 are displayed in Table C.1.1. and Table C.2.1. as lines 1, 2, 3, and 4, respectively.

STEP 2. State Categorical Aids: Data for categorical aids were obtained from reports published by the State Board of Education. Results of these computations are shown in Tables C.1.2. and C.2.2.

STEP 3. Percentage of Wealth Neutral Revenues: Amount of wealth neutral revenues was determined by adding the the sum of state categorical aids. Amount of total revenues was determined by adding the sum of Column 1 to the sum of state categoricals. Percentage was computed by dividing the wealth neutral amount by the total amount and multiplying the result by 100. The results for 1973-74 are displayed in Table C.1.3. and for 1978-79 in Table C.2.3.

Conclusions

As the results show, Illinois fell short of the 85% criteria both in 1973-74 and 1978-79. However, over the period, the percentage of wealth neutral revenues improved from 71.155% in 1973-74 to 77.720% in 1978-79. This compares with 94% in Kansas, 87% in Maine, 87% in North Dakota and 78% in South Carolina in 1977-78.[1]

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1. Results for other states supplied by Dexter A. Majors of the U. S. Office of Education.

Table C.1.1.

COMPUTATION OF FEDERAL WEALTH NEUTRALITY
FOR ILLINOIS USING 1973-74 DATA

		Elementary Districts	High School Districts	Unit Districts	Total
1.	Local Yield[1] + General State Aid for all Districts (Column 1)[2]	540,190,620	370,031,650	1,384,518,580	2,294,740,850
2.	Amount included in line 1 for additional weightings for high school, KG_2 and Title I students. (Column 2)[2]	4,569,847	14,114,016	120,415,920	139,099,783
3.	Minimum revenue per mill per ADA (least of Column 6)[2]	$39.39	$56.32	$23.86	
4.	Sum of the products of line 3, ADA and operating tax rates for all districts (Column 7)[2]	393,280,160	256,039,370	761,137,050	1,410,456,580

1. Local Yield = Equalized assessed valuation x operating tax rate

2. Please see Appendix for the explanation of columns. This is taken from the algorithm to compute federal wealth neutrality recommended by Dexter A. Majors for the Illinois school finance system.

Table C.1.2.

STATE CATEGORICAL AID: ILLINOIS 1973-74

Category	Amount
Teachers' Retirement Fund	123,982,300
Special Education	57,000,000
Transportation (regular, special education, and vocational	56,569,507
Free Lunch Program	13,839,000
Driver Education	9,896,434
Vocational Education (Public school component, 60% of total)	9,504,900
Tuition for Handicapped	7,000,000
Bilingual Programs	6,000,000
Gifted Pupils	3,600,000
Department of Corrections	1,037,800
Tax Equivalent Grants	257,000
Total Categoricals	288,704,941

Table C.1.3

FEDERAL WEALTH NEUTRALITY: ILLINOIS 1973-74

Total Funds:	
Local + State from line 1, Table C.1.1.	2,294,740,850
State Categorical Aid from Table C.1.2.	288,704,941
Total Funds	2,583,445,791
Wealth Neutral Funds:	
State Categorical Aids from Table C.1.2.	288,704,941
Line 4 from Table C.1.1.	1,410,456,580
Line 2 from Table C.1.1.	139,099,783
Total Wealth Neutral Funds	1,838,261,304

Federal Wealth Neutrality Ratio:

$$\frac{\text{Wealth Neutral Funds}}{\text{Total Funds}} = \frac{1,838,261,304}{2,583,445,791} = 0.71155$$

or 71.155%

Table C.2.1.

COMPUTATION OF FEDERAL WEALTH NEUTRALITY
FOR ILLINOIS USING 1978-79 DATA

	Elementary Districts	High School Districts	Unit Districts	Total
1. Local Yield[1] + General State Aid for all Districts (Column 1)[2]	683,758,620	567,487,710	1,907,827,030	3,159,073,360
2. Amount included in line 1 for additional weightings for high school, KG and Title I student (Column 2)[2]	8,670,407	36,564,513	189,429,070	234,663,990
3. Minimum revenue per mill per ADA (least of Column 6)[2]	$49.09	$83.66	$36.63	
4. Sum of the products of line 3, ADA and operating tax rates for all districts (Column 7)[2]	468,075,300	383,573,330	1,248,787,240	2,100,435,870

1. Local Yield = Equalized assessed valuation x operating tax rate

2. Please see Appendix for the explanation of columns. This is taken from the algorithm to compute federal wealth neutrality recommended by Dexter A. Majors for the Illinois school finance system.

Table C.2.2.

STATE CATEGORICAL AID: ILLINOIS 1978-79

Category	Amount
Teachers' Retirement Fund	227,989,100
Special Education	149,500,000
Transportation (regular, special education, and vocational)	91,835,000
Vocational Education	18,840,000
Bilingual Education	14,600,000
School Food Services	14,320,000
Driver Education	10,000,000
Department of Corrections	5,419,200
Gifted Pupils Program	3,630,000
Summer School	2,500,000
Truant Alternative Program	500,000
Total Categoricals	539,133,300

Table C.2.3.

FEDERAL WEALTH NEUTRALITY: ILLINOIS 1978-79

Total Funds:	
Local + State from line 1, Table C.2.1.	3,159,073,360
State Categorical Aid from Table C.2.2.	539,133,300
Total Funds	3,698,206,660
Wealth Neutral Funds:	
State Categorical Aids from Table C.2.2.	539,133,300
Line 4 from Table C.2.1.	2,100,435,870
Line 2 from Table C.2.1.	234,663,990
Total Wealth Neutral Funds	2,874,233,160

Federal Wealth Neutrality Ratio

$$\frac{\text{Wealth Neutral Funds}}{\text{Total Funds}} = \frac{2,874,233,160}{3,698,206,660} = .77720$$

or 77.720%

Discussion

Although the federal wealth neutrality test serves a useful purpose in the measurement of equity in school finance, the confusion and trouble involved in defining and computing wealth neutral revenues renders it less satisfactory than other measures. Conditional wealth neutrality, for example, measures the relationship between wealth and revenues holding tax rates constant. That is, if there were no relationship between wealth and revenue under constant tax rates, it would be equivalent to 100% wealth neutral revenues. Conditional wealth neutrality is much more easily computed without regards to the subtleties involved in the state aid formulas. On the other hand, in determining what is wealth neutral, the problems are numerous. One major problem in states such as Illinois is that of multiple types of districts. Treating each district type separately is only a partial solution to this problem. Economic make-up of dual districts may be much different from that of unit districts, which is, in fact, the case in Illinois, dual districts being wealthier than unit districts. Researchers must face this problem no matter which measure of equity is used in the study. However, the second big problem that is unique to the matter of determining wealth neutral revenues is that of multiple formulas. For example, in Illinois during the time period investigated there was a choice of at least four different computations available to the school districts.

One formula uses enrollment growth computation, another uses a density bonus. By definition, these amounts would be wealth neutral. However, that is a questionable decision because only districts in special situations can take advantage of these bonuses. In the computations for Illinois, both these quantities were assumed to be non-neutral.

Another unique problem in Illinois is the effect of additional weightings for Title I eligibles and high school and kindergarten pupils. These additional weightings are included in the pupil count (TWADA) used to determine the district wealth. Thus, the additional weights not only bring more state aid to school districts in proportion to the higher pupil count, but they help the district get more state aid per pupil by reducing its per pupil wealth. Because of this dual effect of additional weightings, it becomes impossible to judge their total impact on general state aid. From this point of view, the amount of wealth neutral revenues computed for Illinois were probably underestimated.